COST EFFECTIVENESS OF SCREENING OF ALL NEWLY RECRUITED EMPLOYEES FOR DIABETES AT A TERTIARY CARE HOSPITAL

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Background: Diabetes Mellitus is a disease which remains asymptomatic for long duration of time and usually diagnosed either when gets complicated or by routine or opportunistic screening. The practice of universal screening is not recommended, particularly in constraint resources. However, we embarked with a study to assess the yield of recommended screening for Type 2 diabetes in all the newly recruited employees at a tertiary care hospital in Karachi. **Methods:** All the information required for this study was collected from medical records of all newly recruited employees of nursing services department of a tertiary care hospital of Karachi, Pakistan, over a period of 5 months (August 2004 to December 2004). Out of 360 subjects, 326, whose information was found to be complete, were included for final analysis. **Results:** Mean age of the study subjects was 25.3 ± 4.7 years and their mean casual plasma glucose level was 99.1 ± 16.3 mg/dl. 315 (96.6%) study subjects had casual plasma glucose level of 139 mg/dl or less. Only 10 (3.1%) study subjects had casual plasma glucose levels between 140 to 199 mg/dl. Just one employee, 41 years old, was found to have casual plasma glucose level of 213 mg/dl. **Conclusion:** In this study, screening of all individuals for diabetes had a very low yield. Recommendation of universal screening for diabetes does not represent a good use of resources and perhaps not cost-effective. However, periodic screening of high risk individuals should be warranted.

Key words: Diabetes; Screening; Population; Cost-effectiveness

INTRODUCTION

Diabetes Mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. Type 2 diabetes, the most prevalent form of the diabetes, is often asymptomatic in its early stages and can remain undiagnosed for many years until complications appear or screened.[1] Routine screening for diabetes may be justified with rationale to detect it in its earlier stage, to prevent its complication by providing prompt and timely management. However, screening may be appropriate under certain circumstances; as available data do not support universal diabetes screening.[2,3] It is prudent that screening programs of diabetes should be targeted on individuals with multiple diabetes risk factors.[4-8] The greater the number of risk factors present in an individual, the greater the chance of that individual developing or having diabetes. Conversely, the chance of finding diabetes in an individual without a risk factor is low. The prevalence of type 2 diabetes, steadily increases with advancing age, and it is projected that majority of type 2 diabetics will be of age 45 years or more.[9] However, there is very low yield of detecting diabetes by screening persons whose sole risk factor is age.[10] Hence, the likelihood of identifying an asymptomatic individual with diabetes in the general population through random screening is low; however in high risk groups the likelihood is much higher.

There are certain criteria for the screening of diabetes which are recommended by a large number of international organizations and task forces. The American Diabetes Association (ADA)[4], for example, recommends screening for diabetes in individuals of age 45 years and above, every three years. However, The Staged Diabetes Management, Detection and Treatment Quick Guide recommends diabetes screening for all people at age 35 and repeat every three years.[11] Nevertheless, screening should also be considered at a younger age in individuals with certain risk factors like overweight, family history of diabetes (parents and/or siblings), habitual physical inactivity, previously identified impaired fasting glucose or impaired glucose tolerance, history of gestational diabetes and medical illness; hypertension, dyslipidemia, polycystic ovary syndrome and vascular disease.[4,11] These recommendations are endorsed by other working groups and organizations as well.[12]

We undertook a study aimed to assess the yield of recommended screening for Type 2 diabetes and its cost-effectiveness in all the newly recruited employees at a tertiary care hospital.

MATERIALS AND METHODS

This study was conducted at the Aga Khan University Hospital, a tertiary care, teaching hospital in Karachi, Pakistan. Medical records of 360 newly recruited employees of nursing services, referred for pre-employment screening, over a period of 5 months

(August 2004 to December 2004) were assessed. Three variables of interest were sex, age and casual plasma glucose levels. Out of the total 360 cases, we included 326 cases in the final analysis whose information was found to be complete.

The study subjects were predominantly females 319 (98%); as expected owing a group of nursing employees. Pre-employment screening consisted of complete medical, surgical, social (including lifestyle), psychological and family history, physical examination, Haemoglobin estimation, casual plasma glucose level, urine microscopy and a chest radiograph. Employees with casual plasma glucose level of more than 200 were further investigated according to the guidelines. "Casual" was defined as any time of day without regard to time since last meal.[4]

RESULTS

Age and plasma glucose levels of study subjects are given in Table 1. Mean age of the study subjects was 25.3 ± 4.7 years which ranges from 18 to 48 years. Mean plasma glucose level of the study subjects was 99.1 ± 16.3 mg/dl with minimum to maximum range of 63 to 213 mg/dl.

Table 1. Age and plasma glucose levels of study subjects (n=326)

Characteristics	Mean ± SD	Min – Max
Age (in years)	25.3 ± 4.7	18 - 48
Casual Plasma Glucose level (in mg/dl)	99.1 ± 16.3	63 - 213

Distribution of plasma glucose levels by age groups among study subjects is shown in Table 2. In all, 288 (88%) study subjects were of ages between 18 to 30 years (Age group 1) while 38 (12%) were of ages between 31 to 48 years (Age group 2). A huge majority of study subjects 315 (96.6%) had casual plasma glucose level of 139 mg/dl or less and is almost equally distributed in both age groups. Only 10 (3.1%) of study subjects had casual plasma glucose levels between 140 to 199 mg/dl, again equally distributed among both age groups. Only one subject, 41 years old, from Age group 2, had casual plasma glucose level of > 200 mg/dl.

Table 2. Distribution of casual plasma glucose levels by age groups among study subjects (n=326)

Casual Plasma Glucose level	Total (n = 326)	Age group 1 (n = 288)	Age group 2 (n = 38)
= 139 mg/dl	315 (96.6%)	279 (96.9%)	36 (94.7%)
140 to 199 mg/dl	10 (3.1%)	09 (3.1%)	01 (2.6%)
= 200 mg/dl	01 (0.3%)	00 (0.0%)	01 (2.6%)

DISCUSSION

We reviewed the current practice of casual plasma glucose testing on every newly recruited employee to assess its validity, thus cost-effectiveness. The results of this study will help in formulating policies and recommendations for screening for diabetes, among all newly recruited employees, and will also make a ground for further work and research in this regard.

Screening for Type 2 diabetes would allow earlier recognition of cases, with the potential to intervene earlier in the disease course, but whether this would result in improved long-term outcomes is unknown.[13] There is currently no direct evidence as to whether individuals will or will not benefit from early detection of Type 2 diabetes through screening.[14] However, it is suggested that screening programs targeting individuals with multiple diabetes risk factors be worthwhile and cost-effective.[4-8] Universal screening for Type 2 diabetes is not a rationale,[2,3] thus not recommended. Increasing age, being a sole risk factor for Type 2 diabetes, screening has documented a very low yield.[10] In this study, we have found only one study subject who had casual plasma level of 213 mg/dl, which is more than recommended as normal and when we cross tabulated, that particular newly employee was of age more than 40 years.

There is no evidence to demonstrate the benefit and cost-effectiveness of early screening of all newly recruited employees to reduce the morbidity and mortality associated with diabetes in presumably healthy individuals having no risk factors and at younger age than recommended. Such screening recommendation usually does not translate a good use of resources. However, periodic screening of high risk individuals as part of ongoing medical care may be warranted rather than merely a single one time effort.

There are some limitations of this study which should be kept in mind before generalizing its results to all populations. First, the recommended initial screening test of diabetes for non pregnant adult females is fasting plasma glucose while in this study casual plasma glucose test was used for the sake of convenience. Secondly, the study was conducted among certain specified group of employees (Nursing services).

CONCLUSION

Despite of these limitations, to increase the cost-effectiveness of screening for diabetes, testing should be considered in high risk subjects. To be more liberal, it could be recommended that only those who

are 35 years of age and above and below 35 years of age with risk factors, be screened for diabetes by a standard fasting plasma glucose test at the time of recruitment and a periodic screening as part of ongoing medical care. Also, clinicians should be vigilant in evaluating clinical presentation suggestive of diabetes at the time of recruitment and on ongoing basis. We also suggest further research to explore and study the cost-effectiveness and rationale recommendations for screening for diabetes in resource constraint countries like ours.

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